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(54) Improvements in or relating to a shelving arrangement

(57) A shelving arrangement has a number of shelves supported on vertical supports so each support is split into a lower element and a higher element in the region of the shelf. One of these elements has an end portion or reduced diameter which is telescopically received within the tubular end of the other part. The shelf has an aperture of greater diameter than the portion of reduced diameter but lesser diameter than the outer diameter of the other element. The shelf has means to engage the exterior of one of the elements to prevent relative lateral movement between the shelf and the element at a position spaced from the aperture.

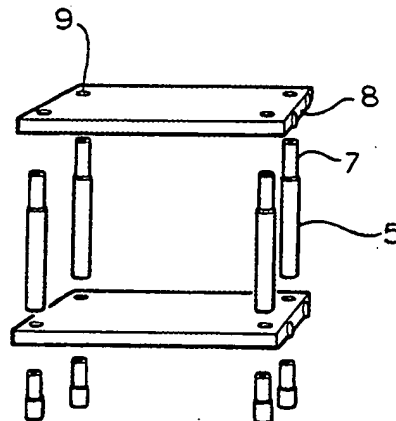
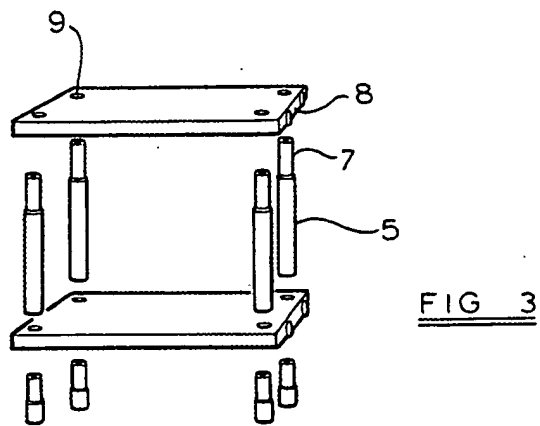
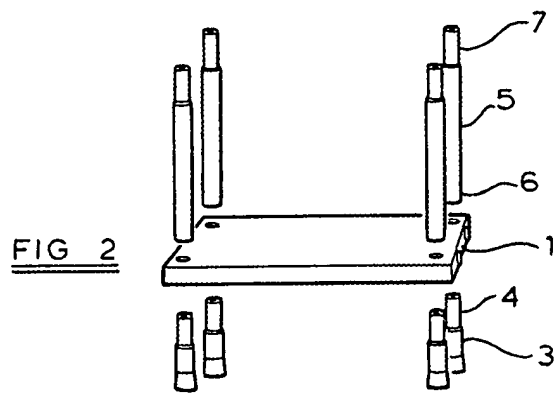
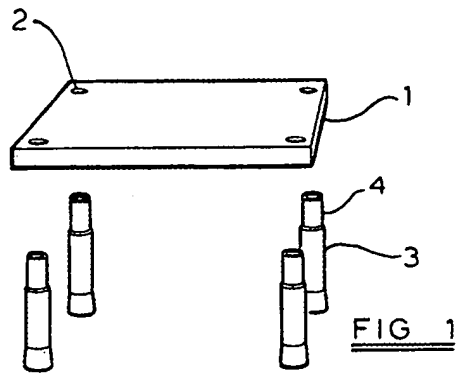
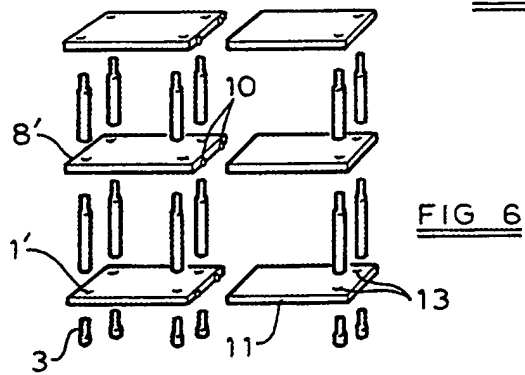
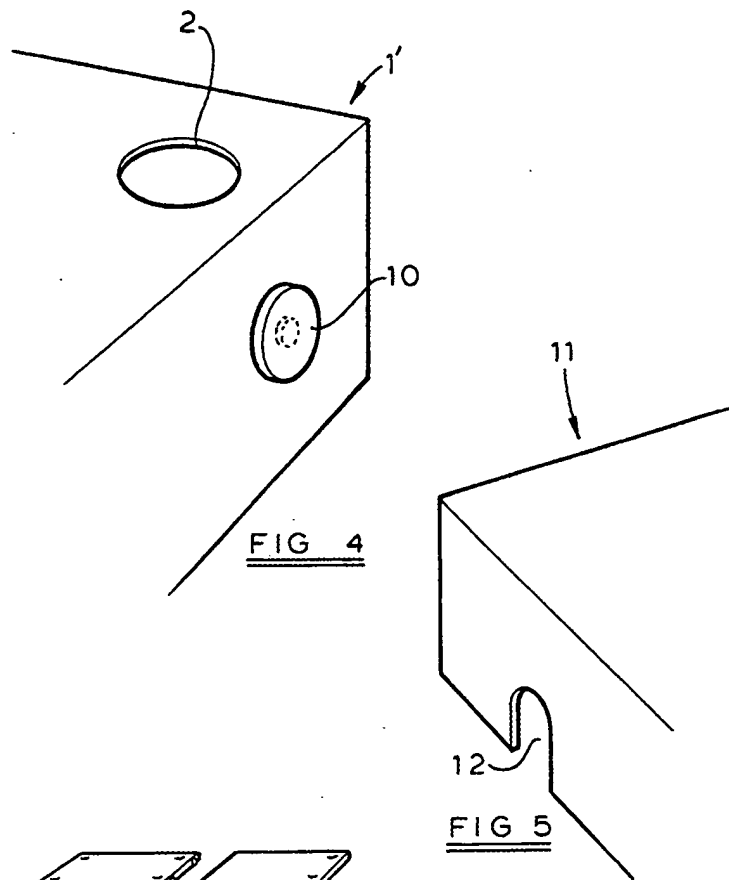


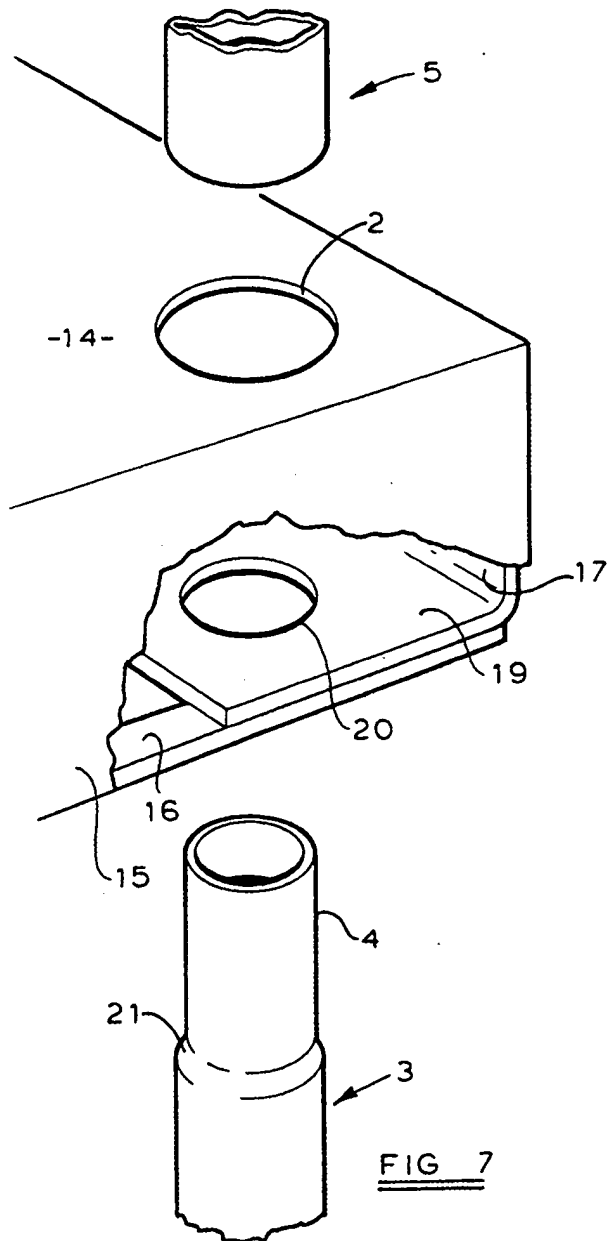
FIG 3

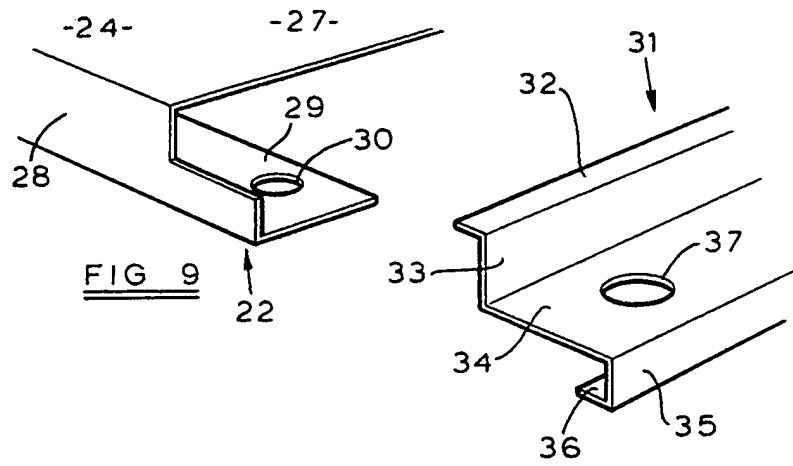
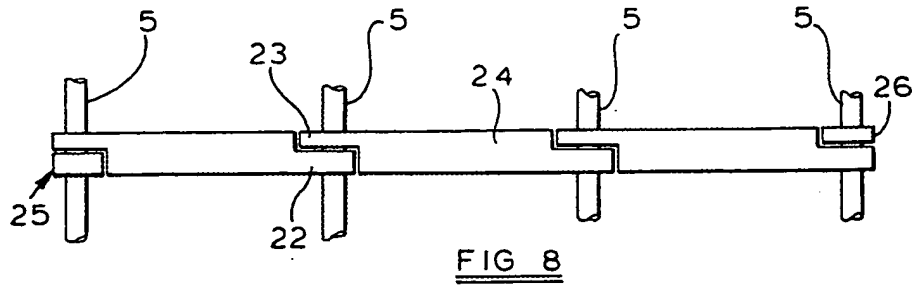
At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

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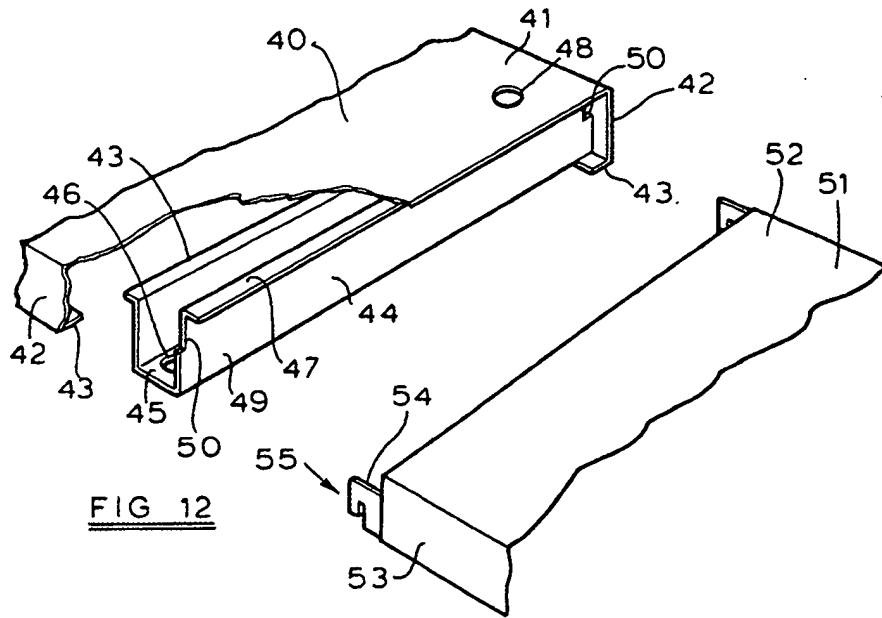


FIG 12

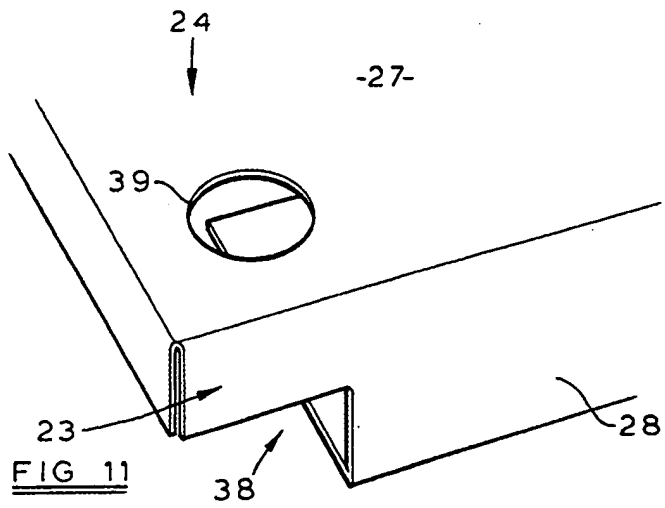


FIG 11

PATENTS ACT 1977

Agents Ref: P5843GB/NHF/er

IMPROVEMENTS IN OR RELATING TO A SHELVING ARRANGEMENT

THE PRESENT INVENTION relates to a shelving arrangement and more particularly relates to a shelving arrangement which can be easily assembled.

It has been proposed previously to provide a shelving arrangement in which a plurality of shelves can be mounted on telescopically engaged aligned groups of elongate upright elements. Each shelf has, at each corner thereof, a tube which is welded to the shelf, or otherwise seared to the shelf, and which extends vertically through the shelf. Each elongate upright element has a shoulder forming a reduced diameter end portion of the element, which is dimensioned to extend through the tube associated with the shelf member. Thus the lower end of the tube in the shelf engages the shoulder. A further upright element engages over the reduced diameter end portion of the element which protrudes beyond the top of the tube in the shelf.

Such a construction is disclosed in South African Patent Specification 63/1209.

This prior art arrangement is relatively expensive to manufacture, since the tubes mounted on the shelves have to be located accurately in position, which requires relatively skilled operations.

The present invention seeks to provide a shelving arrangement which can be assembled easily, but which can be manufactured easily.

According to this invention there is provided a shelving arrangement, said shelving arrangement comprising a plurality of shelves supported on a plurality of vertical supports, each support in the region of each shelf comprising an element beneath the shelf and an element above the shelf, one of said elements having an end portion of reduced diameter, which is telescopically receivable within a tubular end of the other element, the shelf being provided with an aperture having a diameter greater than the said portion of reduced diameter, but less than the outer diameter of said elements, the shelf also having means to engage the exterior of one of said elements to prevent relative lateral movement between the shelf and the said element, at a position spaced from said aperture.

Preferably the support elements are both tubular, the reduced diameter portion provided on said one element comprising an inwardly swaged end portion of the tubular element, the outer diameter of the two elements being substantially equal.

Conveniently the shelf comprises means defining two apertures spaced apart vertically, one of said apertures comprising said aperture having a diameter greater than the diameter of the reduced diameter portion of said support element, the other aperture comprising said guide means and having a diameter slightly greater than the exterior diameter of said elements.

Advantageously the shelf comprises means defining an upper horizontal surface, defining one of

said apertures, and a horizontal flange disposed beneath said means defining the horizontal upper surface, said flange defining the other of said apertures.

Preferably the aperture defined by said flange is the aperture having the diameter slightly greater than the diameter of the reduced diameter portion of the support element.

Conveniently the shelf is formed from pressed metal.

Preferably means are provided to inter-connect shelves horizontally.

In one embodiment the interconnecting means comprise studs on one shelf engageable with notches on an adjacent shelf.

In another embodiment the interconnecting means comprise hooks on one shelf and co-operating means to engage the hooks on an adjacent shelf.

In a further embodiment the arrangement may comprise a plurality of shelves to be mounted at the same level, each shelf being provided, at opposed edges thereof, with projecting portions adapted to cooperate with the corresponding projecting portions of other shelves to form overlapping regions, the said aperture and the said means to engage the exterior of one of said elements being provided in one of said projecting portions, and a further means to engage the exterior of one of said elements being provided in the other of the projecting portions.

Preferably the means to engage the exterior of one of the elements provided in the said other of the

projecting portions comprises an aperture having a diameter slightly greater than the exterior diameter of said element.

Conveniently the arrangement is provided with infill elements for use at either end of the shelving arrangement.

In order that the invention may be more readily understood, and so that further features thereof may be appreciated, the invention will now be described, by way of example, with reference to the accompanying drawings in which:

FIGURE 1 is a perspective view of some components of a shelving arrangement in accordance with the invention during a preliminary stage of erection of the shelving,

FIGURE 2 is a view showing, in an exploded manner, the components of Figure 1, together with further components,

FIGURE 3 corresponds to Figure 2 showing yet further components,

FIGURE 4 is an enlarged view of part of a shelf forming a modified embodiment of the invention,

FIGURE 5 is an enlarged view of part of another shelf adapted to cooperate with the shelf of Figure 4,

FIGURE 6 is an exploded view showing a shelving arrangement incorporating shelves of the design as shown in Figures 4 and 5,

FIGURE 7 is an exploded view, with parts cut

away, showing one connection between a vertical support and a shelf,

FIGURE 8 is a side elevational view of a shelving arrangement in accordance with the second embodiment of the invention,

FIGURE 9 is an exploded view of part of a shelf forming the arrangement of Figure 8,

FIGURE 10 is a view corresponding to Figure 9 showing the part of the shelf when assembled,

FIGURE 11 is a perspective view of the other end of the shelf illustrated in Figures 9 and 10, and

FIGURE 12 is an exploded partly out-away perspective view of another embodiment of this invention.

Referring initially to Figure 1 of the accompanying drawings, a shelving arrangement in accordance with the present invention incorporates a plurality of shelf elements 1, the shelf elements being of rectangular form, and being formed, for example, of pressed metal sheet. A plurality of apertures 2 are provided extending through each shelf element 1, each aperture being adjacent a respective corner of the shelf element. The shelf element 1 illustrated in Figure 1 is to be mounted at a low level and is thus associated with a plurality of short legs or feet 3. The legs or feet are of tubular form, the upper ends thereof 4 being swaged inwardly. The inwardly swaged portions are dimensioned to pass through the apertures 2 formed in the shelf 1. At the base of the swaged portion a shoulder is formed which cannot pass through the aperture in the shelf element.

As can be seen from Figure 2, further tubular vertical support elements 5 may be provided having lower ends 6 adapted to be telescopically received over the swaged upper ends 4 of the feet 3, and also having inwardly swaged upper ends 7.

Thus, in assembling the shelf arrangement, a shelf element 1 is initially mounted on the feet 3, and subsequently further vertical support elements 5 are mounted in position on the swaged upper ends 4 of the feet 3. As illustrated in Figure 3 a further shelf element 8 having apertures 9 therethrough may then be mounted on the inwardly swaged upper ends 7 of the support elements 5. It will be appreciated that any desired number of shelf elements may be mounted in superimposed positions using the described technique, and thus a shelving arrangement of any desired height may be formed.

If it is desired to extend the shelving arrangement laterally, the shelf elements 1', as shown in Figure 4 may be utilised which have, on one side edge, projecting studs 10. Cooperating shelf elements 11 may also be provided having, in selected side edges, notches 12 adapted to receive and engage the studs 10 when located adjacent a shelf element 1'.

The elements shown in Figures 4 and 5 may be utilised to form an assembly as illustrated in Figure 6. It will be appreciated that the left hand part of Figure 6 shows a structure which is similar to, but taller than, that shown in Figure 3. However, each shelf unit 1', 8' in the arrangement shown in Figure 6 presents, at its right hand side, two studs 10. The right hand side of Figure 6 shows a plurality of shelf units of the same design as the shelf unit 11, and it is to be observed that the shelf unit 11 is only provided with two through

apertures 13 located at the side thereof remote from the recesses 12. Thus a shelf structure can be provided, as illustrated in Figure 6 presenting at each level two shelves, the entire arrangement being supported on six upright support elements at each level.

It will be appreciated that the shelving arrangement may be extended both upwardly and laterally to have any desired size utilizing the techniques described above. Expanding elements may be provided to extend from the top of the shelving arrangement to the ceiling to provide added rigidity.

Figure 7 illustrates the structure present at the corner of a shelf 1. The shelf 1 is formed of pressed metal, and presents a planar horizontally extending upper portion 14 defining a load bearing surface, to carry items resting on the shelf, with an aperture 2 formed therein adjacent one corner. The metal forming the horizontal upper portion is bent to form a vertically extending side wall 15 which carries, at its lower edge, an inwardly directed flange 16. Another side wall 17 for the shelf is formed by an element which is welded in position, this side wall carrying another inwardly directed flange 19 which lies above the flange 16. The flange 19 is parallel with, but spaced from, the upper portion 14. Formed in the flange 19 is a further aperture 20 which is co-aligned with the aperture 2. The aperture 20 has a lesser diameter than the diameter of the aperture 2.

Figure 7 illustrates the top part of the foot 2, showing the inwardly swaged portion 4, and also shows the lower part of the next vertical support member 5. The diameter of the inwardly swaged portion 4 of the foot 3 is substantially the same as the diameter of the aperture 20. The exterior diameter of the support

member 5 is substantially the same as the diameter of the upper aperture 2.

It will thus be appreciated that, in assembling the shelf arrangement as described above, initially the inwardly swaged portion 4 is inserted through the aperture 20 and is then located in the region between the flange 19 and the upper part 14 of the shelf. Subsequently the vertical support element 5 is lowered through the aperture 2, and engages the inwardly swaged portion 4 in a telescopic manner. Thus the flange 19 is trapped between the shoulder 21 formed at the base of the inwardly swaged region 4 of the foot 3 and the bottom of the vertical support element 5. The inwardly swaged region 4 is snugly received within the aperture 20. The tubular support element 5 is snugly received within the aperture 2, which acts as a guide to locate the support element 5, and prevent relative lateral movement between the shelf and the support. The shelf is held firmly in position, with virtually no "play". If further shelves are mounted on top of the support element 5, a relatively high pressure may be applied to the flange 19, thus very firmly trapping the flange 19 between the base of the support element 5 and the shoulder 21, thus eliminating any risk of any "play" being apparent.

In an alternative embodiment of the invention, as illustrated in Figures 8 to 11, instead of utilising studs 10 to connect together adjacent shelves, the adjacent shelves effectively overlap each other in the region of the vertical support elements. Thus, as can be seen in Figure 8, the shelving arrangement comprises a plurality of spaced apart vertical support elements 5. In the central region of the illustrated assembly each vertical support element 5 passes through two overlapping portions 22, 23 of each shelf 24. At the

left hand side of the illustrated assembly there is an infill 25 and at the right hand side of the assembly there is an infill 26.

Figure 9 illustrates part of a shelf 24, illustrating a projecting portion 22 which effectively forms the "underlap" as illustrated in Figure 8. The shelf 24 has an upper load-bearing surface 27, having a depending side wall 28 which carries an inwardly directed horizontal flange 29. The lower part of the side wall 28 and the flange 29 project forwardly of the leading edge of the load-supporting surface 27 to form the projection 22. Within the forwardly projecting part of the flange 29 an aperture 30 is formed.

A separate strip 31 is provided to be secured to the edge of the shelf 24, as described, the strip 31 comprising a horizontal lip 32 adapted to be welded or otherwise secured to the underside of the leading edge of the load-supporting surface 27, a vertically extending wall portion 33, a horizontally extending flange 34 which terminates in another vertically depending lip 35 which terminates in a rearwardly extending flange 36. The flange 36 is adapted to be secured, by welding or otherwise, to the upper surface of the leading edge of the flange 29. An aperture 37 is formed in the flange 34. The strip 31 can be assembled to the shelf, 24, as shown in Figure 10. The flange 34 is substantially flush with the upper surface of the reduced height part of the side wall 28 forming the projection 22. The apertures 30 and 37 are co-aligned. The diameter of the aperture 30 is slightly less than the diameter of the aperture 37, so that tubular telescopically interconnected support elements may be engaged with the co-aligned apertures generally in the manner as described above with reference to Figure 7.

Figure 11 illustrates the other end of the shelf 24. The side wall 28 has the lower part thereof cut away to form a recess 38 of a size corresponding to that of the projection 22, the remaining upper part of the side wall 28 forming the "overlap" 23 as illustrated in Figure 8. An aperture 39 is formed in the load bearing surface 27, the aperture 39 having a diameter the same as the diameter of the aperture 37. The position of the aperture 39 is such that when the projection 22 is received within the cutout or recess 38 the aperture 39 is co-aligned with the apertures 30 and 37.

In assembling the shelving arrangement as illustrated in Figures 8 to 11 initially an infill element 25 is taken, which has a design corresponding to the design of the projecting part 22 of the shelf 24. The infill is mounted on a first support element, corresponding to the element 3 as illustrated in Figure 7, and the aperture formed in the lower part of the infill element rests on the shoulder 21. Subsequently an upper support element may be inserted through the aperture 39 formed in the "overlap" of a shelf 24 and maybe engaged with the upper end of the lower support element 3.

A lower support element 3 may then be engaged with the projection 22 formed on the shelf 24. The shoulder 21 engages the relatively small diameter aperture 30, but the inwardly swaged portion 4 of the lower support element 3 passes up through the aperture 37. The next shelf element 24 may then be located in position with the aperture 39 in alignment with the apertures 30 and 37. The upper support element may then be lowered into position passing through the aperture 39 and through the aperture 37 to be brought into engagement with the inwardly swaged region 4 of the

lower support element 3. Part of the flange 29 defining the aperture 30 is caught between the lower end of the upper support element 5 and the shoulder 21 formed on the lower support element 3 thus firmly clamping the shelf element 24 in position. Since there is virtually no play between the aperture 39 and the outer wall of the upper support element 5, the upper shelf 24 is also retained relatively securely in position.

Figure 12 illustrates another modified embodiment of the invention which is similar to the embodiment illustrated in Figures 4 to 6 of the accompanying drawings. However, in the illustrated embodiment of the invention a different method of connecting the shelves together is illustrated.

Referring to Figure 12 a first shelf 40 formed from an element of sheet metal which defines an upper horizontal portion of the shelf 41 from which two side flanges 42 depend, each terminating with an inwardly directed lip 43. A channel-section member 44 extends across the shelf adjacent one end, the channel section member having a base 45 defining apertures 46 therein to receive the lower portions of the vertical support members. The channel has two outwardly directed flanges 47 provided in its upper region which are welded or otherwise secured to the under surface of the sheet 41. The sheet 41 defines two apertures, such as the apertures 48 to receive the upper parts of the vertical support elements.

The side wall 49 of the channel which is closest the free end of the shelf has the upper edge regions thereof cut away to form two notches or recesses 50.

It will be appreciated that the aperture 48 as

illustrated is aligned with an aperture corresponding to the aperture 46 formed in the base 45 of the channel 44 and thus the shelf 40 may be mounted on full vertical support in the manner as described with reference to Figures 1 to 3.

A second shelf 51 which is to be mounted to the right of the first described shelf is formed from a sheet defining an upper surface 52 from which two side walls 53 depend. Each side wall carrying a protruding element 54 the end portion of which defines a hook 55 which can pass through the recess or cut-away portion 50 and engage the lower remaining end part of the side wall 49 of the channel 44. The shelf 51 will be provided with means to engage vertical supports towards the right hand end thereof, these means possibly corresponding with the means illustrated on the shelf 40. It will thus be appreciated that again a large number of shelves may be joined together to extend horizontally to form one very large shelf.

It is to be appreciated that a shelving arrangement of any length may be made using the technique as described, but preferably an infill element 26 is utilised at the right hand end of the arrangement in order to provide a pleasing finish to the completed shelving arrangement.

It is to be appreciated that it will be possible, if desired, to provide extending or clamping elements to be mounted between the top of the uppermost vertical support element and the ceiling of the room in which the shelf arrangement is assembled, in order to provide a totally rigid structure.

CLAIMS:

1. A shelving arrangement, said shelving arrangement comprising a plurality of shelves supported on a plurality of vertical supports, each support in the region of each shelf comprising an element beneath the shelf and an element above the shelf, one of said elements having an end portion of reduced diameter, which is telescopically receivable within a tubular end of the other element, the shelf being provided with an aperture having a diameter greater than the said portion of reduced diameter, but less than the outer diameter of said elements, the shelf also having means to engage the exterior of one of said elements to prevent relative lateral movement between the shelf and the said element, at a position spaced from said aperture.

2. A shelving arrangement according to Claim 1 wherein the support elements are both tubular, the reduced diameter portion provided on said one element comprising an inwardly swaged end portion of the tubular element, the outer diameter of the two elements being substantially equal.

3. A shelving arrangement according to Claim 1 or 2 wherein the shelf comprises means defining two apertures spaced apart vertically, one of said apertures comprising said aperture having a diameter greater than the diameter of the reduced diameter portion of said support element, the other aperture comprising said guide means and having a diameter slightly greater than the exterior diameter of said elements.

4. A shelving arrangement according to Claim 3 wherein the shelf comprises means defining an upper

horizontal surface, defining one of said apertures, and a horizontal flange disposed beneath said means defining the horizontal upper surface, said flange defining the other of said apertures.

5. A shelving arrangement according to Claim 4 wherein the aperture defined by said flange is the aperture having the diameter slightly greater than the diameter of the reduced diameter portion of the support element.

6. A shelving arrangement according to any one of the preceding Claims wherein the shelf is formed from pressed metal.

7. A shelving arrangement according to any one of the preceding Claims wherein means are provided to inter-connect shelves horizontally.

8. A shelving arrangement according to Claim 7 wherein the interconnecting areas comprise studs on one shelf engageable with notches on an adjacent shelf.

9. A shelving arrangement according to Claim 7 wherein the interconnecting means comprise hooks on one shelf and co-operating means to engage the hooks on an adjacent shelf.

10. A shelving arrangement according to any one of the preceding Claims comprising a plurality of shelves to be mounted at the same level, each shelf being provided, at opposed edges thereof, with projecting portions adapted to cooperate with the corresponding projecting portions of other shelves to form overlapping regions, the said aperture and the said means to engage the exterior of one of said elements being provided in one of said projecting portions, and a further means to

engage the exterior of one of said elements being provided in the other of the projecting portions.

11. A shelving arrangement according to Claim 10 wherein the means to engage the exterior of one of the elements provided in the said other of the projecting portions comprises an aperture having a diameter slightly greater than the exterior diameter of said element.

12. A shelving arrangement according to Claim 10 or 11 provided with infill elements for use at either end of the shelving arrangement.

13. A shelving arrangement substantially as herein described with reference to and as shown in Figures 1 to 7 of the accompanying drawings.

14. A shelving arrangement substantially as herein described with reference to and as shown in Figures 8 to 11 of the accompanying drawings.

15. A shelving arrangement substantially as herein described with reference to and as shown in Figure 12 of the accompanying drawings

16. Any novel feature or combination of features disclosed herein.